

S/N 10/664,269

Response to Office Action Dated 6/13/2006

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SEP 13 2006

Applicant respectfully requests reconsideration and allowance of the subject application. Claims 1-50 are pending in this application.

Rejection of the ClaimsRejection under 35 USC § 102(e)

The Office rejected claims 1-50 under 35 USC § 102(e) as being unpatentable over U.S. Patent Application, Publication No. 2004/0219398 to Calhoon, entitled "Fuel Cell Control and Data Reporting," hereinafter the "Calhoon reference" or "Calhoon."

Applicant has 7 independent claims, as provided in the Listing of Claims above. (Claims 1, 16, 32, 35, 38, 45, and 48 are the independent claims.) Applicant's independent claims generally recite "Measuring Fuel by Counting Coulombs" (the current title). Independent claim 1, for example, defines an apparatus, including:

- a fuel cell for producing a flow of electric charges from a fuel;
- an *electric charge counter* coupled with the fuel cell, *wherein counted electric charges are proportional to an amount of the fuel used* in the fuel cell to produce the counted electric charges; and

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- a display coupled with the electric charge counter to show an amount of the fuel based on corresponding counted electric charges. (Emphasis added.)

Similarly, as another example, claim 48 defines a method, including:

- connecting an *electric charge counter* to a fuel cell, wherein the fuel cell produces electric charges from a fuel;
- *counting the electric charges*; and
- *displaying an amount of fuel corresponding to the counted electric charges*. (Emphasis added.)

The Calhoon reference, on the other hand, does not show or disclose each element of claim 1, or of claim 48, or of any of the other of Applicant's independent claims. For example, Calhoon does not show or disclose (or teach or suggest) Applicant's: "electric charge counter;" or "wherein counted electric charges are proportional to an amount of the fuel used;" or "counting electric charges;" or "displaying an amount of fuel corresponding to the counted electric charges."

#### The Calhoon Reference

Calhoon describes calculating a "fuel remaining" parameter " $F_R$ " but the fuel remaining is calculated, not by counting electric charges, but by physical means:

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"The amount of fuel remaining can be determined by any appropriate orientation dependent and/or independent technique. In one embodiment, the value of  $F_R$  is determined, for example, as described above with respect to equations (1), (4), or a combination thereof. Other techniques for determining the amount of remaining fuel include weighing the fuel tank periodically and dividing by the weight per fluid volume, utilizing an electromechanical gauge (e.g., a gas gauge in an automobile), utilizing a sonic transducer to detect the surface of the liquid fuel, determining the free space in the fuel tank and calculating the liquid remaining, or a combination thereof, for example." (Paragraph [0086]).

Equation (1), just cited, calculates the fuel remaining by subtracting the fuel consumed from the total fuel. However, the fuel consumed is calculated "utilizing the output of the fuel flow meter 226" (line 3 of paragraph [0061]). Fuel flow meter 226 in Fig. 2 is a mechanical fuel metering device connected to the "fuel line" between the fuel supply and the fuel cell, as shown, and is not connected to the electrical output of the fuel cell. Fuel flows through the fuel flow meter 226, not electrical quantities (lines 10-11 of paragraph [0033]; claim 12).

Equation (4), just cited, calculates fuel remaining as a product of a version of the universal gas law " $PV=nRT$ " but the variables in Equation (4) are physical entities like temperature and pressure, not electrical entities ( $R$  is the universal gas constant). Thus, in another Calhoon embodiment, fuel remaining is calculated via the "output of the fuel pressure transducer 326 and the fuel tank temperature sensor 325" (lines 3-4 of paragraph [0080]; claim 16). In Fig. 3, the fuel pressure transducer 326 is in line with the fuel line and is not connected to the electrical output of the fuel cell. The fuel tank temperature sensor 325 is attached to the fuel tank, and is not connected to the electrical output of the fuel cell.

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The Calhoon embodiments include a current sense circuit 220 that "senses the electrical current being provided to the host processor 218 from the fuel cell pack 234 and provides a signal indicative of this sensed electrical current to the smart controller 214" (lines 1-5 of paragraph [0030]). "Also, a signal indicative of the voltage provided to the host processor 218 from the fuel cell pack 234 is provided to the smart controller 214 at voltage sense point 230" (lines 6-8 of paragraph [0030]). In other words, the output current and voltage levels are monitored for purposes of displaying the current level and the voltage level (lines 1-4 of paragraph [0079]), and for purposes of controlling fuel flow—increasing fuel flow if the current or voltage levels drop (lines 6-12 of paragraph [0033]).

The Calhoon fuel cells also may calculate a remaining power capacity " $C_R$ ," but this parameter is derived from  $F_R$ , which in turn is derived from a physical measurement of fuel, not by counting electric charges, as explained above. The Calhoon fuel cells also calculate a time remaining " $T_R$ ," but this parameter is derived from  $C_R$ , which again is derived from  $F_R$ , which in turn is derived from a physical measurement of fuel, not by counting electric charges.

It should be evident from the foregoing discussion that in Calhoon, calculation of fuel used or fuel remaining is based on a physical measurement associated with the fuel line or the fuel tank. Calhoon does not show or disclose measuring fuel by counting Coulombs / charges.

Since the Calhoon reference does not show or disclose each element of at least one of Applicant's claims, the 35 USC 102(e) rejection fails. Applicant respectfully requests that the rejection be removed, and submits that the claims are allowable.

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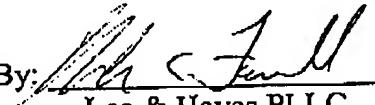
**CONCLUSION**

Applicant respectfully submits that claims 1-50 are in condition for allowance and requests reconsideration and issuance of the subject application. Should any matter in this case remain unresolved, the undersigned attorney respectfully requests a telephone conference with the Examiner to resolve any such outstanding matter.

Respectfully Submitted,

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